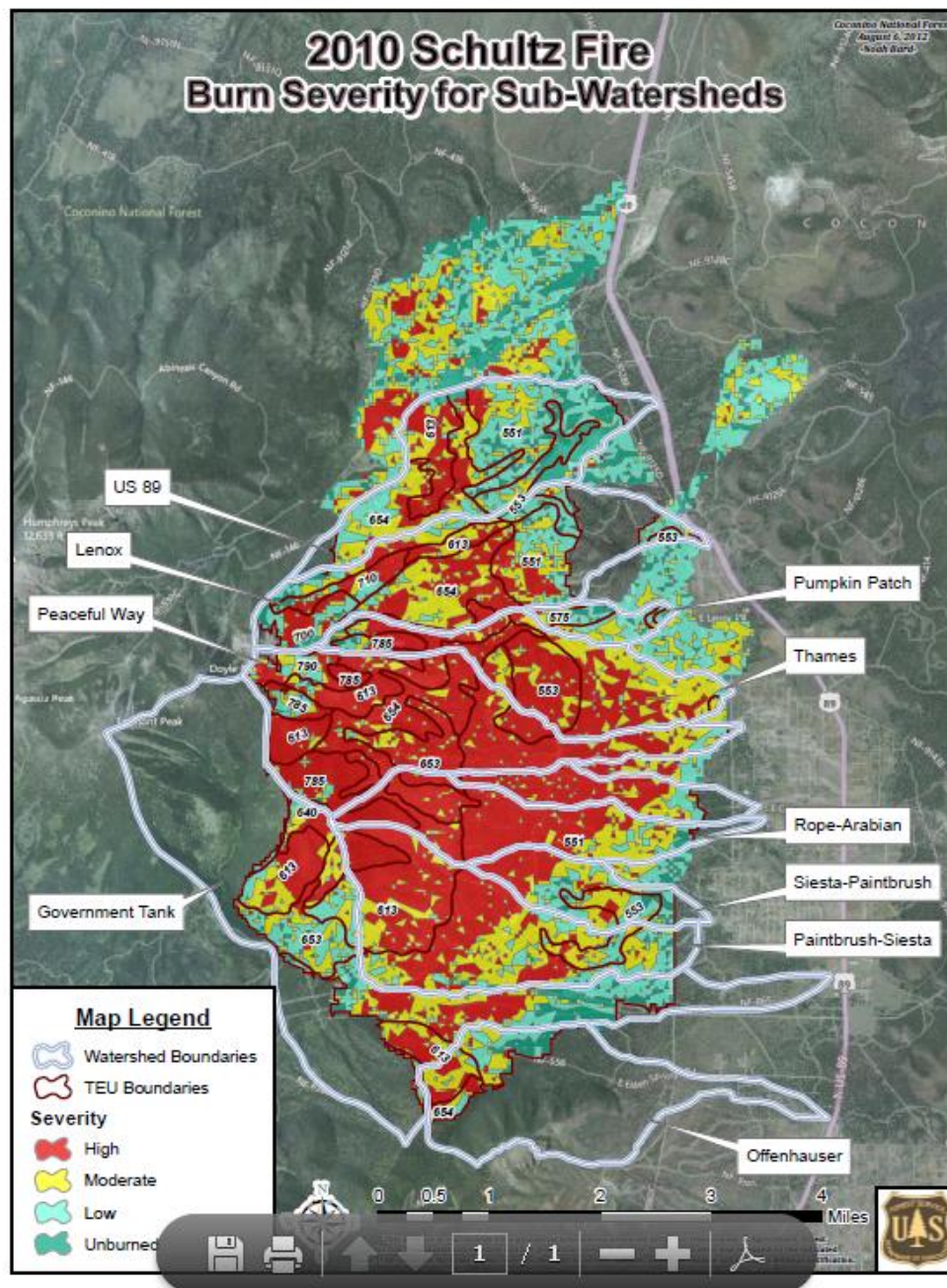




Schultz Fire, Coconino National Forest Recovery, June, 2013

2010 Schultz Fire Burn Severity for Sub-Watersheds



Watershed Recovery Best to Least

Watershed Name	Recovery (1 is best, 9 least)	Watershed Condition	Risk of Accelerated Erosion and Runoff (1 is lowest, 9 is highest)
Pumpkin Patch	1	Good	1
Copeland	2	Good	2
Siesta Paintbrush	3	Good	3
Lenox	4	Good	4
Government Tank	5	Fair to Good	5
Thames	6	Fair to Good	6
Rope Arabian	7	Fair to Good	7
Peaceful Way	8	Good Fair-Poor (steep slopes) Good (slopes < 40%)	8
Paintbrush-Siesta	9	Poor (steep slopes) Fair (slopes < 40%)	9

Watersheds in good hydrologic condition (green) have low runoff potential and less likely to flood downstream following high storm events.

Watersheds in fair (orange) to poor (red) condition have higher runoff potential and more likely to flood downstream following high storm events.

Findings

- From 2010 to June, 2013, slopes less than 40% have improved from poor to good hydrologic condition and should not contribute greatly to high runoff and flood events.
- Steep slopes (>40%) on north half of fire have improved greatly from poor to fair or good condition while steep slopes on south half have not improved much except on north aspects.

Executive Summary

- Watersheds that are dominated by good hydrologic conditions are Lenox, Pumpkin Patch, Copeland and Siesta-Paintbrush and likely have little risk of accelerated erosion, runoff and downstream flooding. All other watersheds have appreciable acres in either fair or poor hydrologic condition to varying degrees and continue to be at risk of accelerated erosion runoff and downstream flooding following high intensity storms.
- Until the majority of the entire watershed (including the majority of the steep slopes $> 40\%$) are in good hydrologic condition, (about 5 years) there is risk of accelerated erosion, increased runoff and downstream flooding compared to pre fire conditions following high intensity storms.

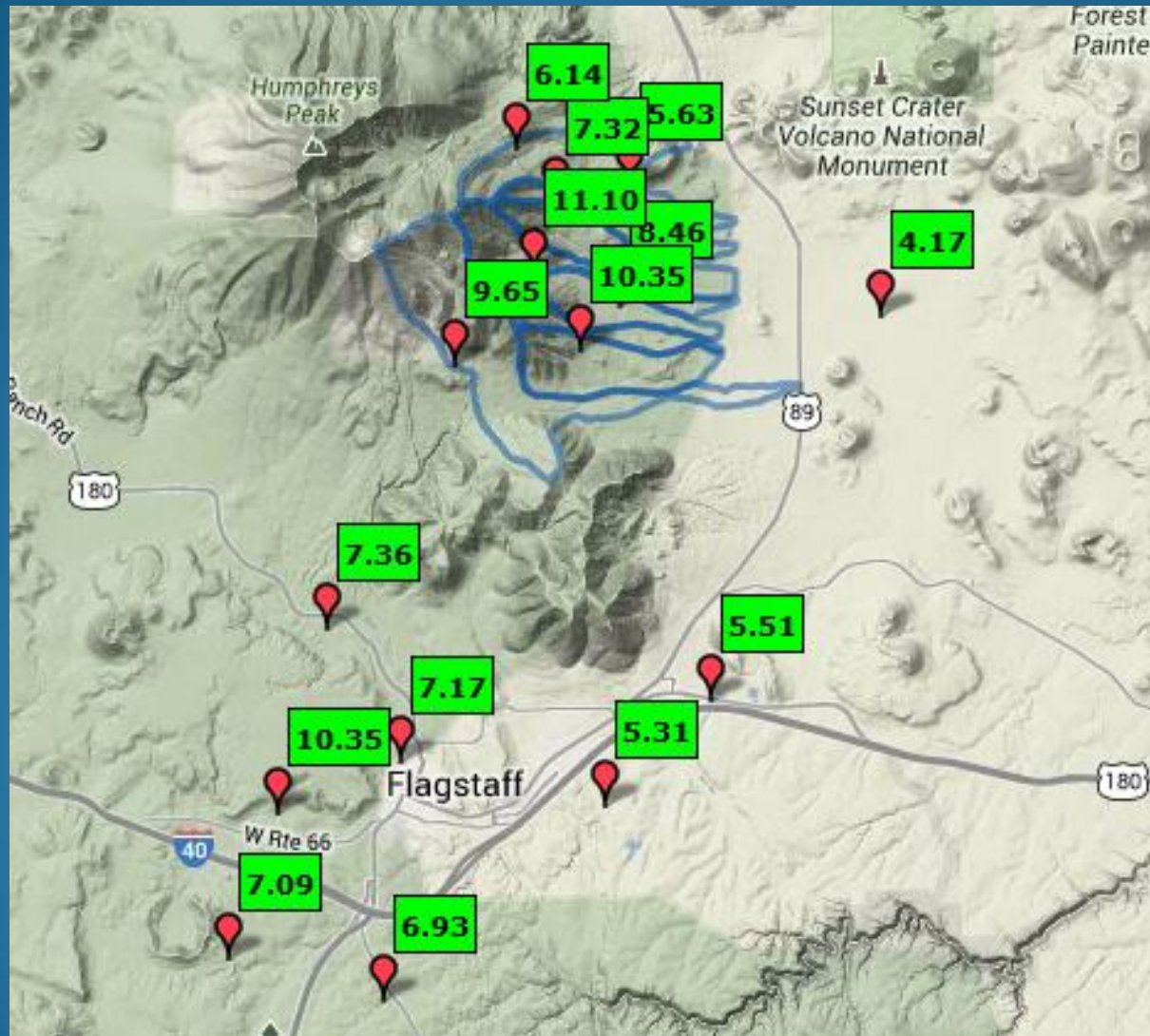
Burn Severity Acres by Subwatershed

Table 2 lists the burn severity by each of the subwatersheds. Subwatersheds 4, 5, 6, 7, and 9 experienced high burn severities on more than 50% of the subwatershed area. Subwatersheds 5 & 7 experienced high burn severities on more than 70% of the subwatershed area.

Table 2: Burn severity by Subwatersheds.

Subwatershed	Subwatershed Area (acres)	Burn Severity Within Subwatershed								Total Burned	
		Unburned		Low		Moderate		High			
		(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)	(%)
1	1,525	355	23%	480	31%	423	28%	266	17%	1,525	100%
2	1,847	438	24%	399	22%	475	26%	535	29%	1,847	100%
3	216	24	11%	116	54%	63	29%	12	6%	216	100%
4	1,197	19	2%	59	5%	412	34%	707	59%	1,197	100%
5	2,026	58	3%	127	6%	309	15%	1,532	76%	2,026	100%
6	473	80	17%	35	7%	80	17%	277	59%	473	100%
7	1,003	57	6%	47	5%	182	18%	716	71%	1,003	100%
8	535	74	14%	153	29%	150	28%	158	30%	535	100%
9	1,715	74	4%	224	13%	540	32%	876	51%	1,715	100%
10	3,852	2,468	64%	480	12%	456	12%	447	12%	3,852	100%
11	1,563	1,268	81%	91	6%	133	9%	70	5%	1,563	100%
Totals =		4,915		2,213		3,225		5,598		15,952	

July 2013 Precipitation



Natural Recovery, 2011

Natural Recovery on Low Burn Severity,
TES 551



Veg Ground Cover about 70%, Good
Hydro Condition, HSG B

Natural Recovery on High Burn Severity
Aspen



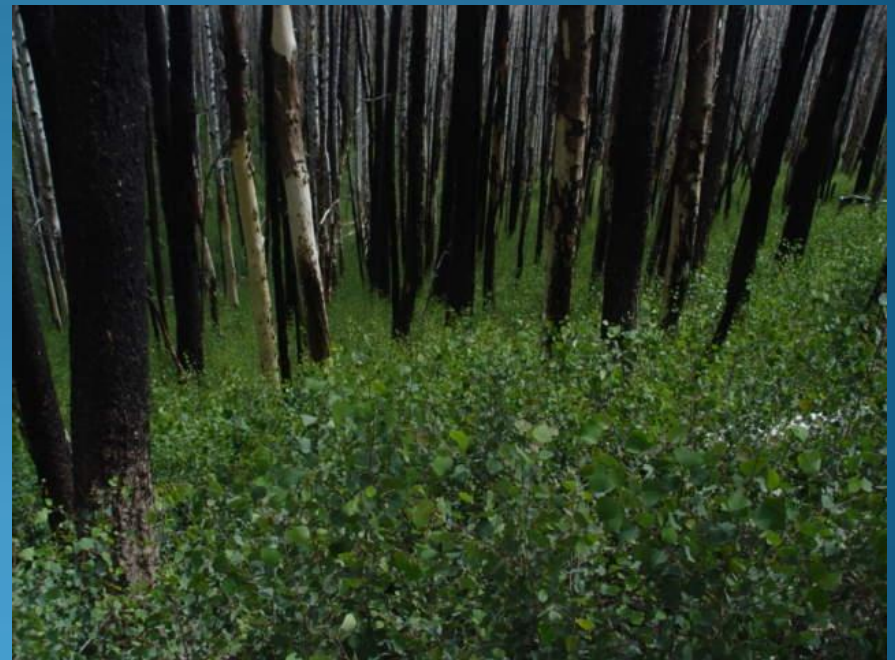
Veg Ground cover about 50%, Fair
Hydro Condition, HSG B

Leroux Watershed Upper Slopes

2011



2012



Veg Ground Cover about 50%, Hydro
Condition, Fair, HSG B

Thames Watershed Woodshred Mulching above Waterline Road 2011



Thames Watershed Along FR 420 TES Map Unit 551



August, 2010, Seeding in
Background, Natural Reveg in
Foreground. Veg Ground Cover
15%, Poor Hydro Condition



June, 2012, Veg Ground Cover
about 35%, Fair Hydro
Condition, HSG B

TES Map Units 553, Moderate Slopes of 15-40%



Veg Ground Cover about 35-40% (Fair Hydrologic Condition) and HSG B

TES Map Unit 654, 15-40% Slopes



Veg Ground Cover
about 30-40% (Fair
Hydro Condition)
HSG B

Agricultural Straw on Slopes Greater than about 35% - Schultz Fire,
Paintbrush-Siesta Watershed,



Limited success on northern slopes



Low success on southern slopes

August, 2010 Versus June, 2012 South Aspects on TES MU 785 in Paintbrush-Siesta Watershed



August, 2010



June, 2012

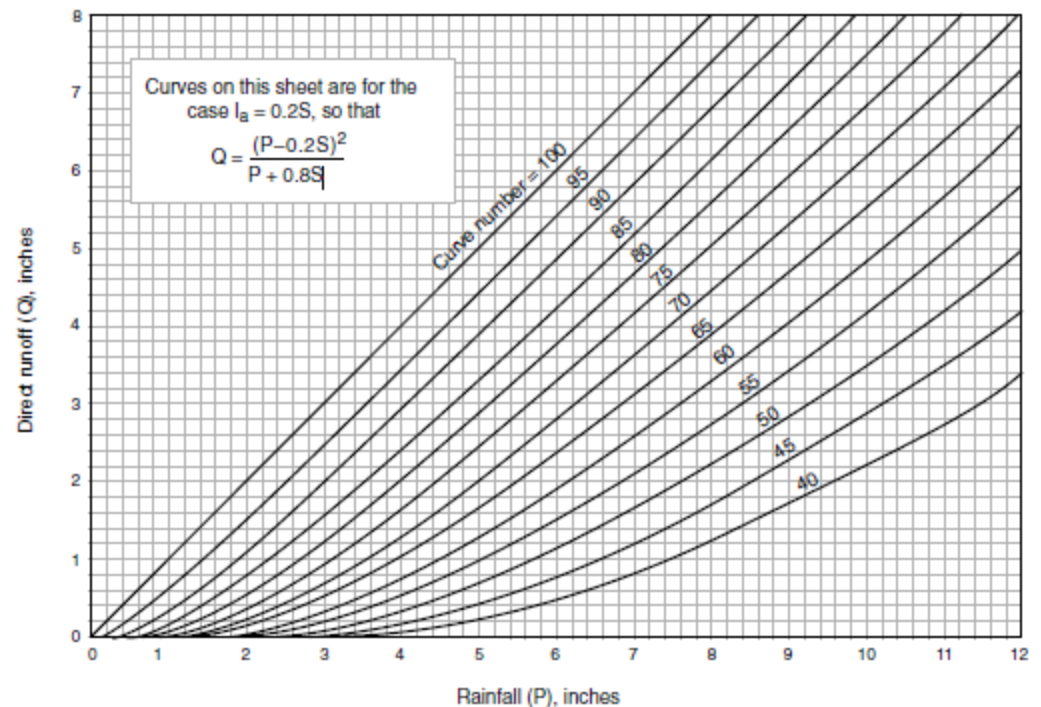
Veg Ground Cover about 10%, Poor Hydro
Condition, HSG D (Shallow Soils)

Waterline Road Gabion Baskets TES Map Unit 700, Thames Watershed



Runoff, Rainfall, CN

Figure 2-1 Solution of runoff equation.



Cover type

Table 2-2 addresses most cover types, such as vegetation, bare soil, and impervious surfaces. There are a number of methods for determining cover type. The most common are field reconnaissance, aerial photographs, and land use maps.

Treatment

Treatment is a cover type modifier (used only in table 2-2b) to describe the management of cultivated agricultural lands. It includes mechanical practices, such as contouring and terracing, and management practices, such as crop rotations and reduced or no tillage.

Hydrologic condition

Hydrologic condition indicates the effects of cover type and treatment on infiltration and runoff and is generally estimated from density of plant and residue cover on sample areas. *Good* hydrologic condition indicates that the soil usually has a low runoff potential for that specific hydrologic soil group, cover type, and treatment. Some factors to consider in estimating the effect of cover on infiltration and runoff are (a) canopy or density of lawns, crops, or other vegetative areas; (b) amount of year-round cover; (c) amount of grass or close-seeded legumes in rotations; (d) percent of residue cover; and (e) degree of surface roughness.

TR-55 Prefire Runoff Curve Numbers

Chapter 2

Estimating Runoff

Technical Release 55
Urban Hydrology for Small Watersheds

Table 2-2d Runoff curve numbers for arid and semiarid rangelands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition ^{2/}	A ^{3/}	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

^{1/} Average runoff condition, and $I_{a,2}$ = 0.2S. For range in humid regions, use table 2-2c.

^{2/} Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

^{3/} Curve numbers for group A have been developed only for desert shrub.

AGWA Pre and Post Fire Curve Numbers

Table 1: Original and revised AGWA-based Curve Number estimates as a function of hydrologic soil group, land-cover class and burn severity (low, moderate or high)

Class	Name	Cover	A	B	C	D
84a	Bare	0	77	86	91	94
84	Fallow	5	76	85	90	93
22	High Intensity Residential	10	81	88	91	93
21	Low Intensity Residential	15	77	85	90	92
33	Transitional	20	72	82	87	90
51	Shrubland	25	63	77	85	88
71	Grasslands/Herbaceous	25	49	69	79	84
41	Deciduous Forest	50	55	55	75	80
42	Evergreen Forest	50	45	66	77	83
43	Mixed Forest	50	55	55	75	80
51	Shrubland	25	63	77	85	88
41l	Deciduous Forest	43	59	60	78	82
42l	Evergreen Forest	43	49	71	80	85
43l	Mixed Forest	43	59	60	78	82
51l	Shrubland	21	65	79	86	89
41m	Deciduous Forest	34	65	65	80	85
42m	Evergreen Forest	34	55	76	82	88
43m	Mixed Forest	34	65	65	80	85
51m	Shrubland	17	68	82	88	90
41h	Deciduous Forest	25	70	71	83	87
42h	Evergreen Forest	25	60	82	85	90
43h	Mixed Forest	25	70	71	83	87
51h	Shrubland	12	73	88	91	91

Note: l - low severity burn
m - moderate severity burn
h - high severity burn

CNs from BAER team reports on the Cerro Grande (Evergreen), and Oracle Hill Fires (Deciduous Forest and Shrubland) using a 40-mm rainfall event.